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ABSTRACT

Each of 31 sixth grade students read and recalled two texts with different content and structure in a study of structural factors contributing to recall. The subjects' immediate and delayed (one week) recalls were categorized into propositional text bases for a comparative analysis of the effects of different text's recall proportions, recall categories, types of propositions recalled, hierarchical levels of information in recall, and template text position of propositions in recall. The results indicated that proficient sixth grade readers do utilize texts differing in structure in different ways when given reading and recall tasks. As was expected, proportionately more propositions were recalled from texts with story narrative structures than from descriptive informational texts. Although text structure was not found to affect the proportions of propositions recalled for each recall category (entailed, evoked, external, and general recall), the story narrative texts produced better recall of predicate and connective propositions, of content at higher hierarchical levels, and of content within specific sections of the texts. When the subjects were asked to state which text was remembered better, 22 out of 31 subjects chose the topic with the story narrative structure. (RL)

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Schemas for reading texts differing
in organization: a study of sixth
grade proficient readers.

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SCHEMAS FOR READING TEXTS DIFFERING IN ORGANIZATION:

A STUDY OF SIXTH GRADE PROFICIENT READERS

Introduction

The notion that children can acquire more information from stories than from prose organized in other ways has been discussed by reading researchers and educators (Harris & Smith 1972; Karlin 1975). The "once upon a time...and they all lived happily ever after" categories of this type of prose are well-known and well-used tags for remembering content about particular stories.

Children, throughout their primary school experience, are fed a healthy diet of information through the story format. Yet, in upper primary and high school years, children are expected to acquire information written in a variety of organizational forms or structures. Apart from the narrative, or story, the child is expected to read and understand among other organizational forms, directions for activities, cause-effect relationships, problems and their solutions, logical arguments, and descriptions about particular objects.

The distinction between the child's utilization of the story form and his ability to acquire information from texts which are not organized in story form has been noted - but little more than cursory attention has been given to the

factors which make up this distinction.

What makes a text difficult?

In the past, factors which make texts difficult or easy have included: the loading of unfamiliar vocabulary in a particular text and the length and complexity of sentences in a particular text. These factors have been used as measures of "Readability" to guide selection of books and passages for use in schools, libraries and numerous experimental studies.

The topic about which a text is written, has also been shown to affect how much or how little can be comprehended from text. This excerpt, from an undergraduate Economics text is difficult to read even if you know the meaning of each of the words:

Planned gross private investment expenditure is the outcome of the decisions of individual businessmen made in the light of comparisons of the expected profitability of current investment opportunities with the availability and cost of finance. Investment expenditure occurs in established firms; it also occurs in the process of establishing new firms. In established firms it is possible to distinguish in principle between replacement expenditure, that is, expenditure designed to offset the wearing out and obsolescence of the existing capital stock, and net investment, that is, the expansion of the capital stock itself. (Harcourt, Karmel & Wallace, 1968).

Such a text is only comprehensible when the reader or listener can call upon a wide range of experiences and prior knowledge about economics in general, and planned gross private investment expenditure in particular, and can relate the text

information to the knowledge which s/he already possesses. Studies by Pace (1977) and Cambourne (1978) have emphasized the importance of prior knowledge.

The context of a text also affects how well it can be comprehended. Giving a text a "before" and "after", or a "time" and "place" to fix its meaning will aid text comprehensibility. Studies by Bransford & Johnson (1972), indicated the importance of a context for understanding text. You can imagine that a context for the passage to follow would well affect how the text was comprehended and later recalled!

The procedure is actually quite simple. First you arrange things into different groups depending on their makeup. Of course, one pile may be sufficient depending on how much there is to do. If you have to go somewhere else due to lack of facilities that is the next step, otherwise you are pretty well set. It is important not to overdo any particular endeavor. That is, it is better to do too few things at once than too many. In the short run this may not seem important, but complications from doing too many can easily arise. A mistake can be expensive as well. The manipulation of the appropriate mechanisms should be self-explanatory, and we need not dwell on it here. At first the whole procedure will seem complicated. Soon, however, it will become just another facet of life. It is difficult to foresee any end to the necessity for this task in the immediate future, but then one never can tell.
(Bransford & Johnson, 1972; Expt. 2)

Comprehension is also dependent upon the ability within the reader to understand how text information is structured or whether no structure exists. (Rumelhart 1975; Mandler & Johnson, 1977). It is with this variable of text difficulty

that this study is particularly concerned.

What has been discovered about the structure of texts?

Much of our knowledge of the structure of texts is concerned with the structure of stories. Stein and Glenn (1979) have shown that people of all ages seem to use similar organizational procedures or schema to predict and recall stories. A study in which kindergarten, third and fifth graders were asked to produce stories given the story settings showed an increased utilization of purposive behaviours, well specified motives and goals, with age. This was presumed to reflect an increased familiarity with what constituted a well-formed story.

When information is organized in a simple story form, more is recalled than when the organization of the story is less well-structured, or randomly put together (Thorndyke, 1975). This fact is also evident when very young children are presented with a series of pictures which comprise a story. (Kintsch, 1977). Texts with identical structures but different content produce similar patterns of recall after reading (Meyer, 1975).

In addition to the macrostructure of text, (Kintsch & Van Dijk, 1976) certain features or signals within text are used by the author to explicitly state the text's organizational structure. For instance in the following text, the

underlined signals are used within the text to relate a problem to its solution.

"A problem of vital concern is the prevention of oil spills from supertankers...." "The solution to the problem is not to immediately halt the use of tankers on the ocean....Instead the solution lies in the training of officers of supertankers, better building of tankers, and installing ground control stations to guide tankers near shore...." (Meyer, Brandt, & Bluth, 1978)

Meyer, Brandt & Bluth (1978), found that proficient ninth grade readers used the same structure or schema for recall as the author had originally used in writing the above text; while those who were rated poor readers did not. Utilization of the author's schema was found to aid recall.

While some studies of text structure have described the use of the story or narrative structure, and others have described the processing of expository prose, there seems to have been little attempt to compare readers' utilization of texts differing in structure. This study aimed to identify differences in readers' recall patterns which could be attributed to differences in text structure.

How is text structure analyzed?

New procedures have been developed for analyzing text structure. Several procedures identify the function of ideas as organized by the authors (Rumelhart, 1975; Kintsch & Van Dijk, 1976; Stein & Glenn, 1977). Others identify concepts within text and arrange them hierarchically according

to the frequency of occurrence of concepts. (Crothers, 1972; Kintsch, 1974).

Such procedures enable the researcher to describe the structure of a text and to evaluate which types of ideas are most often found in subjects' recalls of certain text structures. For example: Kintsch's (1974) system for classifying the function of ideas represented in text defines three aspects of reading which are assumed to be processed when comprehending text:

1. Understanding a text involves understanding word concepts which appear as lexical entries in semantic memory.
2. Word concepts are ordered by certain rules to form propositions which are considered to be the basic units of meaning (Kintsch et al 1975).
3. Propositions are connected to one another if they share a word concept. They are ordered according to their relative importance in the text.

In Kintsch's propositional analysis of text, as outlined by Turner & Greene (1977), the verb is the central propositional unit from which other propositions are derived and in relation to which the arguments of a proposition are ordered according to Fillmore's (1969) case grammar.

In identifying text propositions, each is numbered

and written on a separate line. Each text base contains level 1 or superordinate propositions which are thematic ideas within text. A propositional hierarchy can be devised by considering those propositions which introduce new ideas in the text (superordinate propositions) and those which repeat ideas or arguments of higher level propositions (subordinate propositions). An example of a text excerpt from the study, diagrammed according to Kintsch's propositional analysis is found in Figure 1.

List of Propositions

	Level					
	1	2	3	4	5	6
1.	(EXIST, A:CELL)					
2.		(QUALITY OF, CELL, NERVE)				
3.			(QUALITY OF, 2, TINY)			
4.				(QUALITY OF, 3, VERY)		
5.	(NEED, A:\$, O:MICROSCOPE)					
6.		(STUDY, A:\$, O:2)				
7.		(PURPOSE:TO, A1:5, A2:6)				
8.			(CONJ:AND, 4, 7)			
9.	(EXIST, A:NEURON)					
10.		(LOCATION:IN, A1:9, A2:2)				
11.		(POSSESS, A:9, O:BRANCHES)				
12.			(QUALITY OF, 11, TINY)			
13.			(QUANTITY OF, 11, MANY)			

"A nerve cell is very tiny and a microscope is needed to study it. In a nerve cell there is a neuron. It has many tiny branches." (Furniss 1979)

Figure 1

A text excerpt diagrammed according to Kintsch's propositional analysis.

However Kintsch's propositional analysis system does

not adequately describe the macrostructure of a text in the detail presented by Rumelhart (1975). Rumelhart's grammar to account for the structure of simple stories, uses a series of rules to describe the function of specific text categories. Several researchers have used and modified the original grammar: (Thorndyke, 1975; Gentner, 1976; Mandler & Johnson, 1977; Stein & Glenn, 1977). In this study, the rules as modified by Thorndyke (1975) were used to describe the structure of STORY NARRATIVE texts. A simple description of DESCRIPTIVE INFORMATIONAL texts was devised by the author.

How is comprehension of text assessed?

In part, what is understood about the process of comprehension is guided by the methods used to assess them. Many studies of comprehension of text have used free recall in assessment of what is retained after reading. Differing methods of qualitative analysis have shown that readers recall the more general, thematic information units from text. (Kintsch et al 1975; DeFratis Evans, 1977). In addition, knowing how an author has organised information within text has been shown to increase recall (Brown, 1975; Thorndyke, 1975; Meyer, Brandt and Bluth, 1978).

Free recall has been categorized according to superordinate and subordinate propositions (DeFratis Evans, 1977), and new and old information (Haviland and Clark, 1974). These

categorizations emphasize the hierarchical nature of text analyses but often fail to account for all of the information which is recalled. By categorizing all of the utterance and not just the information which can be compared to text base propositions, more details may be inferred about the strategies which a child uses to recall orally information which has been read.

Drum & Lantaff (1977) have developed four categories of recall for encoding all of the recall utterance of a comprehender. These four categories were used in this study to categorize subjects' recall of text. They are explained by means of examples from transcripts collected for this study.

A. Text Specific Information - Protocol propositional units which are text specific are the same or synonymous with text propositional units.

A1 Verbatim recall of text propositions.

A2 Synonymy of elements in text propositions:

Text: All sounds are caused by vibrations.

Protocol: "Sound is made of vibrations." (Subject 6)
TELEPHONE DESCRIPTIVE INFORMATIONAL passage.

A3 Substitution of pronouns if the referent is present elsewhere in recall.

A4 Propositional contractions:

Text: A nerve cell is very tiny and a microscope is
is needed to study it.

Protocol: "Nerve cells are microscopic." (Subject 15)
NERVE CELLS DESCRIPTIVE INFORMATIONAL
passage.

- B. Text Entailed Information - Protocol propositional units which summarize information from two or more text propositions, put together text specific information in new ways, or add text related information that is semantically entailed by the text (i.e., text connecting inferences).

B1 Inferences entailed by the text:

Text: Bell's first telephone words were a cry of help. He had spilled acid over his clothes.

Protocol: "The first thing he said into the telephone was a cry for help because he had spilled acid all over his clothes." (Subject 4)
TELEPHONE STORY NARRATIVE passage.

- B2 Case related information involves the inclusion of reasonable information in terms of the context of the stimulus passage. A content expert may be required to judge the adequacy of such prior information as represented in a recall protocol.

Text: Alexander Graham Bell was a professor at Boston University. He experimented with electricity. In 1876 he found a way to carry the voice by using electricity.

Protocol: "He was working with voice like he was tryin' to transmit voices for like deaf people."
(Subject 29) TELEPHONE STORY NARRATIVE passage.

- B3 Local summary - Protocol propositional units which summarize text propositional units.

Text: Alexander Graham Bell was a professor at Boston University. He experimented with electricity. In 1876, he found a way to carry the voice by using electricity.

Protocol: "Alexander Graham Bell worked at Boston University and he made the telephone."
(Subject 13) TELEPHONE STORY NARRATIVE passage.

B4 Predicate expansion of text propositional units.

Text: Golgi found they don't really join at all. They leave tiny gaps called synapses.

Protocol: "He looked at them and he saw that they leⁿt little gaps...." (Subject 30 NERVE CELLS STORY NARRATIVE passage.

B5 Argument/Attribute expansion of text propositional units

Text: A nerve cell is very tiny and a microscope is needed to study it.

Protocol: "A nerve cell is a tiny thing....you can't see it with the human eye you have to have a microscope. (Subject 29) NERVE CELLS DESCRIPTIVE INFORMATIONAL passage.

C. Text Evoked Information - Protocol propositional units

which are peripheral to text propositional units, generalizations without specific text relationships and erroneous responses.

C1 Faulty inference.

Text: In 1873, Golgi found a way of staining nerve celles with silver salts. Then he could study them with a microscope. He could see details of the nerve cell that others had not seen before.

Protocol: "He looked under this microscope that no one's ever seen." (Pilot study data)
NERVE CELLS STORY NARRATIVE passage.

C2 Erroneous expansion of text propositional units.

Text: Until silver salts were used to stain nerve

cells, there was no way of knowing what a nerve cell looked like. Now doctors know that the branches in different nerve cells don't really join at all.

Protocol: "....they use the salt and they find that the nerve cells are not connected by these things and with this salt by studying these nerve cells they can find um the difference in the nerve cells when people are under stress...." (Subject 15) NERVE CELLS DESCRIPTIVE INFORMATIONAL passage.

C3 Unacceptable substitutions of text proposition units and errors.

Text: A telephone transmitter is a thin sheet of metal.

Protocol: "Electricity has a transmitter that is a thin sheet of metal." (Subject 1) TELEPHONE DESCRIPTIVE INFORMATIONAL passage.

C4 Experiential intrusions.

Text: The metal sheet bends and makes another copy of voice sounds. The person you are talking to hears this copy of the sounds of your voice.

Protocol: "The sounds that you hear right now are actually vibrations coming from me." (Subject 1) TELEPHONE DESCRIPTIVE INFORMATIONAL passage.

C5 Generalizations with no specific relationship to text propositional units.

Protocol: "it was about the medicine 'n stuff." (Subject 20, Delayed Recall) NERVE CELLS DESCRIPTIVE INFORMATIONAL passage.

C6 Arguments from text propositional units recalled without predicates or with predicates that are related to story telling conventions.

Text: Whole of NERVE CELLS DESCRIPTIVE INFORMATIONAL passage.

Protocol: "the other one was about cells." (Subject 31, Delayed Recall) NERVE CELLS DESCRIPTIVE INFORMATIONAL passage.

Text: As it bends back, the metal pushes against a box full of carbon grains. This makes the carbon wiggle.

Protocol: ".....the metal.....the carbon it.....the bends." (Subject 8) TELEPHONE DESCRIPTIVE INFORMATIONAL passage.

D Text External Information - Protocol information which has no relationship to text propositional units, is a repetition of previously recalled statements, or a false start.

D1 Story telling conventions which relate to the experimental situation.

Text: They leave tiny gaps called synapses.

Protocol: "They are separated by little spaces called some technical name I don't remember." (Subject 19) NERVE CELLS DESCRIPTIVE INFORMATIONAL passage.

Protocol: "Well in 8...um 1890 something I can't remember the date this guy did....things about nerve cells." (Subject 25, Delayed Recall) NERVE CELLS STORY NARRATIVE passage.

D2 Repetitions of previous statements in recall.

Protocol: "And at the end of the paragraph he finds out that they don't really join together something like that, some sort of nerves don't join together." (Subject 28) NERVE CELLS STORY NARRATIVE passage.

D3 False starts, statements which appear to be left hanging.

Protocol: "...the transmit ah the part you speak into

in a telephone it's really a piece of sheet metal which vibrates when you speak into it it vibrates against a bunch 'a grains and then it goes the vibrations through the wire...." (Subject 27) TELEPHONE DESCRIPTIVE INFORMATIONAL passage.

What do children know about how they remember?

Brown (1975) has noted that asking children what they know about what they remember and how they remember after reading, might be a useful source of information related to the understanding of the comprehension process (Brown, 1975, 110-113). For this reason a series of interview questions was asked of each subject in the research study, to see if children were aware that texts were organized differently.

Research Study*

This study investigated factors which distinguished sixth grade proficient readers' recall of texts differing in structure. The following diagram summarizes the investigation.

- | | | |
|---|---|--|
| 1. Survey of science content area texts | 2. Writing of 10 experimental texts according to set criteria | 3. Ranking of experimental texts according to content familiarity** |
| 4. Selection of four experimental texts for use in study. | 5. Cloze tasks based on chosen texts to check readability levels.** | 6. Individual silent reading/oral recall activities in Immediate and Delayed recall situations Interview questions. ** |
| 7. Analysis of texts, student recalls and interview responses. | 8. Analysis of presentation order differences. | 9. Collapsing of original groupings to compare recall differences between structures within the same content topic. |
| 10. Results and Implications for Reading teaching, testing and writing texts. | | |

Table 3 Overview of the study

- ** These tasks were completed by mutually exclusive groups of subjects randomly assigned from a group of 140 students defined as proficient sixth grade readers by their scores of 77% on the Reading Subtests of the Stanford Achievement test (Kelley et al)

The four experimental texts conformed to the following criteria:

-
- * This study is described in full in Furniss, E.R. (1979) Schemas for reading and recall of story narrative and descriptive informational texts: a study of sixth grade proficient readers. Unpublished doctoral dissertation, University of Alberta, Edmonton, Alberta, 1979.

1. At a 5-6 level according to a traditional readability formula (Dale & Chall, 1945)
2. About two content topics which had been rated as relatively unfamiliar by a group of sixth grade proficient readers.
3. According to two text structures - i.e. the four experimental texts were NERVE CELLS STORY NARRATIVE, NERVE CELLS DESCRIPTIVE INFORMATIONAL, TELEPHONE STORY NARRATIVE, TELEPHONE DESCRIPTIVE INFORMATIONAL. (See Appendix 1 Figures 1-4)
4. With similar ratios of proposition types viz., predicate, modifier, and connective.
5. With similar proportions of propositions occurring within particular text sections viz., STORY NARRATIVE: Theme ' Setting, Plot, Resolution. DESCRIPTIVE INFORMATIONAL: Topic Identification, Topic Expansion, Conclusion Statements.
6. Within the instructional level of sixth grade proficient readers as indicated by cloze test results.

PROCEDURES

Each subject was tested individually and asked to read and recall two texts differing by content and structure. Contents and structures were counterbalanced. One week later, the subject was asked to recall each text. In addition, interview questions were asked to see what strategies children used to remember texts differing by content and structure.

ANALYSIS OF CHILDREN'S RECALLS

The subjects' immediate and delayed recalls were analyzed into propositional text bases using Kintsch's method of analyzing discourse (Turner & Greene, 1977). The text bases were further divided into recall categories: text recall, text entailed recall, text evoked recall and text external recall

(Drum & Lantaff, 1977) (See Appendix 2). Responses to interview questions about strategies used to remember text were grouped according to similarities and differences.

Uniformity of patterns of recall across topics, structures and orders of presentation meant that original groupings could be collapsed to allow investigation of text structure effects on recall between subjects within one content topic. Two content topics were used to show that results were not peculiar to one set of texts. Three way analyses of variance were performed on the data between:

1. Structure, time of recall, and recall proportions (text recall, text entailed recall)
2. Structure, time of recall, and recall categories (text, entailed, evoked, external)
3. Structure, time of recall, and proportions of types of proposition recalled (predicate, modifier, connective)
4. Structure, time of recall, and hierarchical levels of information in recall (high, medium, low)
5. Structure, time of recall and template text position of propositions in recall.

Results

FACTOR STUDIES	RESULTS
1. Recall Proportions	More propositions were recalled from STORY NARRATIVE texts than from DESCRIPTIVE INFORMATIONAL texts in both content topics.
2. Recall Categories	Text structure was not found to affect the proportions of propositions recalled in each category. However in delayed recall the decrease in text and text entailed information, with a corresponding increase in evoked and external information was significant (See Appendix 2, Figure 1)
3. Types of Propositions Recalled	Predicate and connective propositions were recalled more frequently in STORY NARRATIVE texts than they were in DESCRIPTIVE INFORMATIONAL texts. (See Appendix 2, Figure 2)
4. Hierarchical levels of information in recall	In STORY NARRATIVE texts, content at higher levels in the hierarchy of propositions (e.g. Levels 1 and 2) was better recalled than propositions at lower levels. Recall of DESCRIPTIVE INFORMATIONAL texts did not follow this pattern. (See Appendix 2, Figure 3)
5. Template text position of propositions in recall	Proportionally more propositions were recalled within all three text sections in the STORY NARRATIVE structure than in the DESCRIPTIVE INFORMATIONAL structure. Most significant were the differences between STORY NARRATIVE and DESCRIPTIVE INFORMATIONAL resolution conclusion sections. (See Appendix 2, Figure 4)
6. Responses to interview questions	Subjects saw texts as differing according to content and function. When asked to state which text was better remembered, 22 out of 31 subjects chose the content topic with the STORY NARRATIVE structure. (See Appendix 2, Fig. 5)

Discussion

Results from this study indicated that sixth grade proficient readers do utilize texts differing in structure in different ways when given reading and recall tasks.

As was expected, proportionately more propositions were recalled from texts written according to a STORY NARRATIVE structure. The sixth grade proficient reader, in approaching a STORY NARRATIVE text, does so with a set of story expectations or story schema for organizing information. However, at this level, where exposure to DESCRIPTIVE INFORMATIONAL prose is not as pervasive, many students do not have available a set of expectations for organizing DESCRIPTIVE INFORMATIONAL text.

Although text structure was not found to affect the proportions of propositions recalled in each recall category, these results need to be discussed further. A study by Drum (1978) of the recall patterns of able and less able Grade 8 readers found that able Grade 8 readers recalled more text and text entailed information and were able to recall information from all sections of a text. Less able Grade 8 readers either stated a text proposition and then repeated it, or they stated an idea and elaborated on it without reference to the template text. The behaviour described by Drum as representative of less able Grade 8 readers were often present in the recall protocols of these proficient Grade 6 readers. (See Appendix 2,

Figure 1.) Several more years experience with DESCRIPTIVE INFORMATIONAL prose separates the two groups of subjects. It seems reasonable to suggest that sixth grade proficient readers are more prone to making generalizations with no specific relationships to template text propositional units and to making erroneous responses than are eighth grade proficient readers.

The fact that predicate and connective propositions in STORY NARRATIVE texts were recalled more frequently than they were recalled in DESCRIPTIVE INFORMATIONAL texts mirrored results obtained in a similar study by Gomulicki (1956). He found that descriptive, modifying segments of prose were poorly recalled in longer passages, while "agent-action-effect" units were recalled best. Children appear to be able to view the connecting ideas as they function with STORY NARRATIVE texts and to retrieve them within a coherent recall utterance. DESCRIPTIVE INFORMATIONAL text coherence features, in the form of connective propositions, may not have as important a function as they are represented in STORY NARRATIVE texts.

Text structure affected the proportions recalled within text sections of STORY NARRATIVE and DESCRIPTIVE INFORMATIONAL texts. Whereas children expect a STORY NARRATIVE to have a "happily ever after" section (Mandler & Johnson, 1977) they are not necessarily able to recall the conclusive summary or evaluative statement which ends a DESCRIPTIVE INFORMATIONAL text.

The subjects' responses to the interview questions suggested that, at least unconsciously, the STORY NARRATIVE structure facilitated comprehension and recall of information.

Conclusions

Findings from this study served to outline differences between STORY NARRATIVE and DESCRIPTIVE INFORMATIONAL text structures as shown by differences in recall of information from these two text types.

Results would indicate the proficient sixth grade readers viewed the STORY NARRATIVE text which they read, as isomorphic to previously read STORY NARRATIVE texts. However the same readers may not view DESCRIPTIVE INFORMATIONAL texts as coherent entities and may not have developed a set of expectations or a schema for reading texts with this structure.

Thus, this study lends support to a concept of reading comprehension as a complex of interrelated processes, one of which is text structure utilization. The degree of utilization of the structure of text for the acquisition and recall of information varies with different text structures.

Implications of the study

An important implication of this research has been to illustrate that traditional predictors of text difficulty, such as readability measures, do not account for all of the factors which make a text easy or difficult for someone to read. Text variables such as text structure, the number of

propositions in the text base, the types of propositions which represent ideas in a text base, and the categories of text which are represented in a text base can and should be used for evidence of text difficulty.

Sixth grade proficient readers seem to prefer to read information conveyed by a STORY NARRATIVE text structure. However children at this age need to be exposed to a variety of text structures to allow them to comprehend many of the texts prescribed at junior high and high school levels.

When recall and questioning tasks are used to evaluate a reader's comprehension of text, the variable of text structure needs to be taken into account. One way of evaluating text structure utilization would be to develop tests using several texts differing in structure and yet at the same level of difficulty in terms of proposition density and type, as well as readability level.

A delineation of the structure of text also enables the development of a series of questions which entail content but check on acquisition of information from specific text positions. Questions could be asked about specific text sections as outlined in a story grammar or a delineation of DESCRIPTIVE INFORMATIONAL text. This would be another way of evaluating how readers utilize text structures, as well as allowing for similar types of questions to be asked of different texts.

Writers of children's texts need to provide well organized information with clearly identifiable text structures.

Overall, the results of this study have emphasized that text structure utilization is a variable which affects the acquisition of information from text. Schemas for reading and recall of STORY NARRATIVE and DESCRIPTIVE INFORMATIONAL texts are different for sixth grade proficient readers. Such differences in proficient readers at sixth grade level suggest further explorations of the behaviour of less proficient and beginning readers in developing and utilizing differential text structures.

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Appendix 1

Table 1 A student's recall categorization

- Figure 1 Structural Organization of Nerve Cells Story
Narrative Text
- 2 Structural Organization of Telephone Narrative
Text
 - 3 Structural Organization of Nerve Cells Descrip-
tive Informational Text
 - 4 Structural Organization of Telephone Descriptive
Informational Text

PROPOSITION CATEGORY	PROPOSITION NUMBER	STUDENT RECALL - ONE	STUDENT RECALL - TWO	TEXT RECALL		TEXT ENTERED		TEXT WOULD		EXTERNAL KEY	
				ONE	TWO	ONE	TWO	ONE	TWO	ONE	TWO
P 1	ISA, ALEXANDER GRAHAM BELL, PROFESSOR	1. (CONCERN, STORY, AGB)	(CONCERN, ONE, AGB)							✓ Well	
C 2	(LOC: AT, 1, BOSTON UNIVERSITY)	2. (DISCOVER, AGB, TELEPHONE)				✓ PH		✓		✓ And (12)	
P 3	(EXPERIMENT, 1, X: ELECTRICITY)									✓ um (12)	
P 4	(FIND, 1, WAY)									✓ it was (12)	
P 5	(CARRY, 1, ELECTRICITY, VOICE)										
C 6	(PURPOSE: TO, 4, 5)										
C 7	(TIME: IN, 6, 1876)	19. (TIME: IN, 2, 1876)		✓ CH		✓ PH					
P 8	(MAKE, 1, 1: SHEET, TRANSMITTER)	3. (HAVE, AGB, METAL)				✓ MM					
M 9	(QUALITY OF, SHEET, METAL)	4. (QUALITY OF, METAL, PIECE)									
M 10	(QUALITY OF, 9, THIN)	5. (QUALITY OF, 4, THIN)		✓ MM		✓ TH				✓ And (6)	
P 11	(EXIST, BOX)	6. (SPEAK, AGB)									
P 12	(POSSESS, BOX, SAND)	7. (LOC: ON, 6, 5)						✓		✓ Ann (12)	
M 13	(QUALITY OF, SAND, GRAINS)	8. (MAKE, SOUND)						✓		✓ oh (12)	
C 14	(LOC: BEHIND, 12, METAL)									✓ I forget Lsp	
P 15	(RUN, ELECTRICITY)									✓ um sounds	
C 16	(LOC: THROUGH, 15, 13)									(19)	
P 17	(VIBRATE, METAL)	9. (VIBRATE, THINGS, 4)				✓ CH				✓ And (10)	
P 18	(EXIST, SOUNDS)										
M 19	(QUALIFY, SOUNDS, VOICE)										
C 20	(CAUSALITY: MAKE, 19, 17)										
P 21	(WIGGLE, 13)										
C 22	(CAUSALITY: MAKE, 20, 21)										
P 23	(FLOW, ELECTRICITY, 1: WIRE, 6: RECEIVER)										
P 24	(POSSESS, ELECTRICITY, AMOUNTS)										
M 25	(QUALIFY, 24, DIFFERENT)										
C 26	(CAUSALITY: THEN, 22, 23)										
P 27	(REFERENCE: 25, COPIES)										
P 28	(POSSESS, 19, COPIES)										
M 29	(QUALIFY, COPIES, DIFFERENT)										
P 30	(MAKE, 1, 1: 10, RECEIVER)	10. (COME, THINGS)									
C 31	(CONJUNCTION: ALSO, 8, 30)	11. (LOC: OUT, 10, RECEIVER)									
P 32	(PULL, ELECTROMAGNET, 9)										
C 33	(LOC: TOWARDS, 32, ITSELF)										
C 34	(CAUSALITY: MAKE, 25, 33)										
P 35	(VIBRATE, SHEET)										
P 36	(HEAR, 1, 19)										
C 37	(CONJUNCTION: AND, 35, 36)										
C 38	(CAUSALITY: BECAUSE, 34, 37)										
P 39	(POSSESS, 1, WORDS)	12. (POSSESS, AGB, CRY)		✓ PH						✓ And (12)	
M 40	(QUALITY OF, WORDS, TELEPHONE)	13. (QUALIFY, 12, FIRST)		✓ MM						✓ cr. a (12)	
M 41	(QUALIFY, 40, FIRST)										
P 42	(REFERENCE, 41, CRY)	14. (REF, CRY, HELP)		✓ MM		✓ (Mother, Apogee)				✓ um (14)	
M 43	(QUALITY OF, CRY, HELP)										
P 44	(SPILL, 1, ACID)	15. (SPILL, AGB, ACID)		✓ PH							
C 45	(LOC: OVER, 44, CLOTHES)	16. (LOC: ON, 15, CLOTHES)		✓ CH							
P 46	(POSSESS, 1, CLOTHES)	17. (POSSESS, AGB, CLOTHES)		✓ PH							
		18. (CAUSALITY: COS, 14, 16)									
HIERARCHY OF PROPOSITIONS		LEVEL OF TEMPLATE TEXT PROPOSITION		T. 8 T. 0		T. 7 T. 0		T. 4 T. 1		T. 12 T. 0	

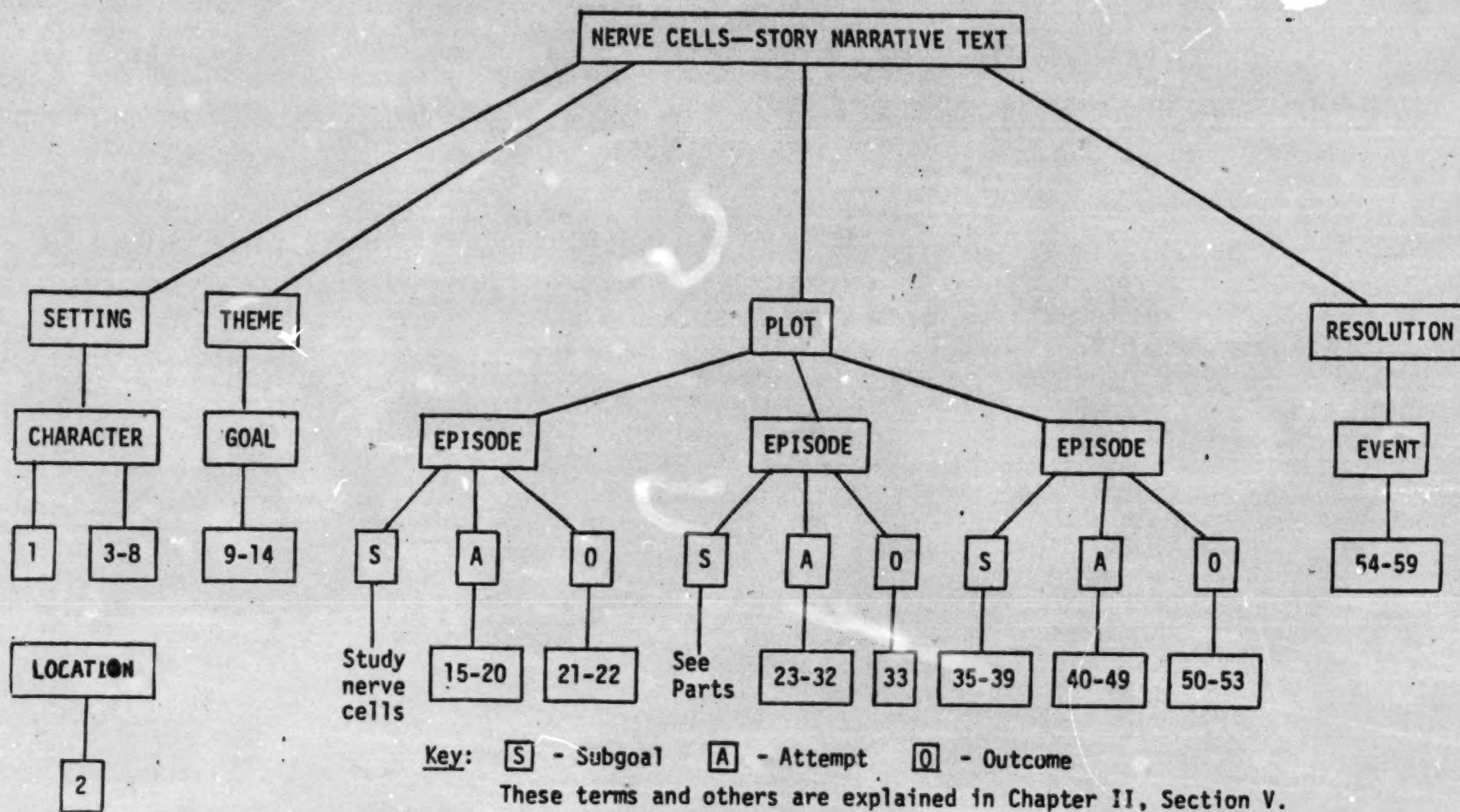


Figure 1
 Structural Organization of NERVE CELLS STORY NARRATIVE Text

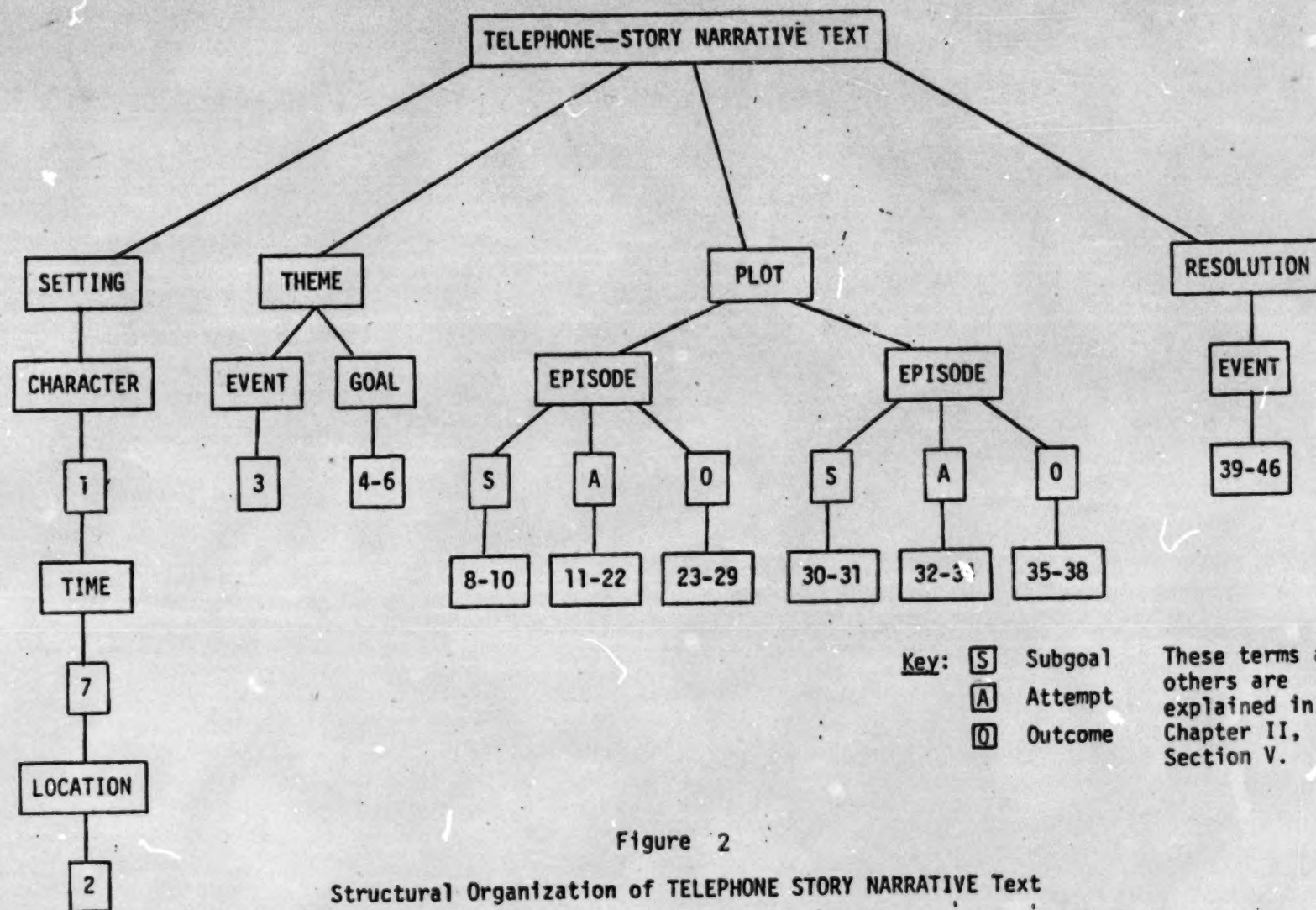


Figure 2

Structural Organization of TELEPHONE STORY NARRATIVE Text

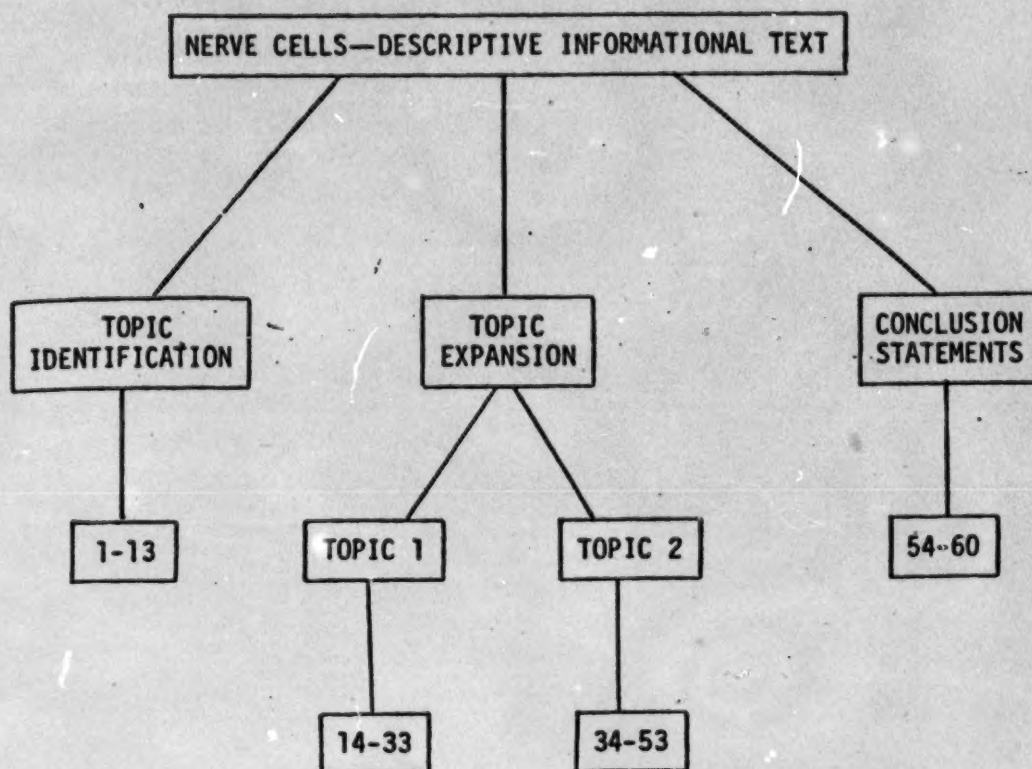


Figure - 3

Structural organization of NERVE CELLS
DESCRIPTIVE INFORMATIONAL Text

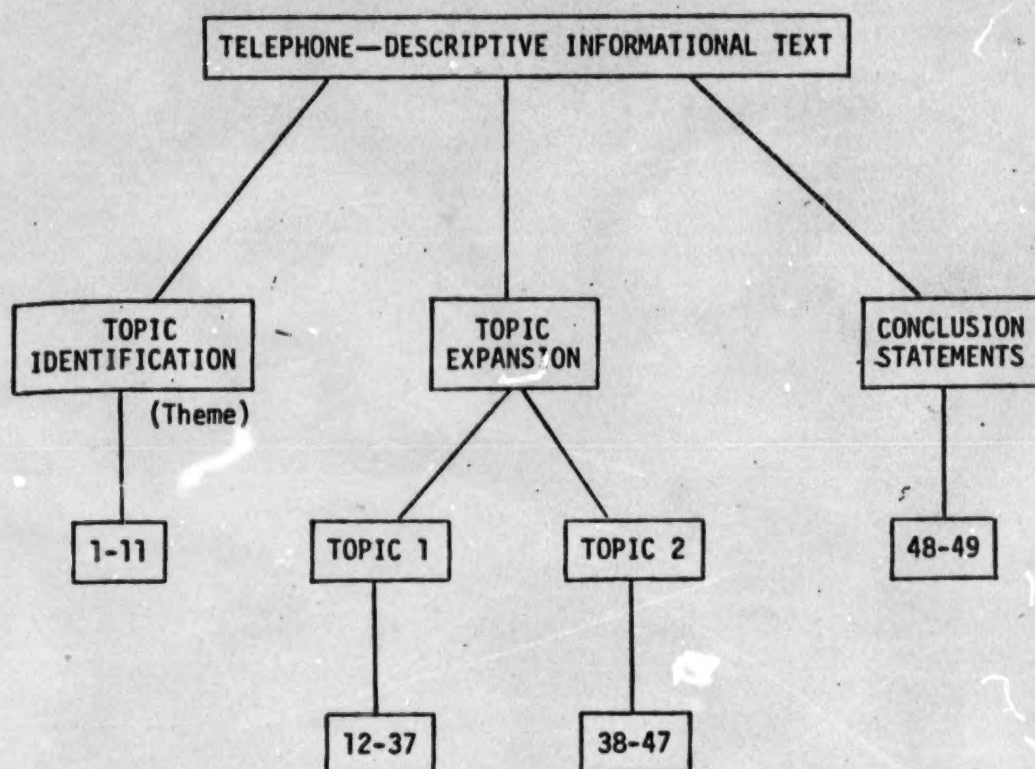


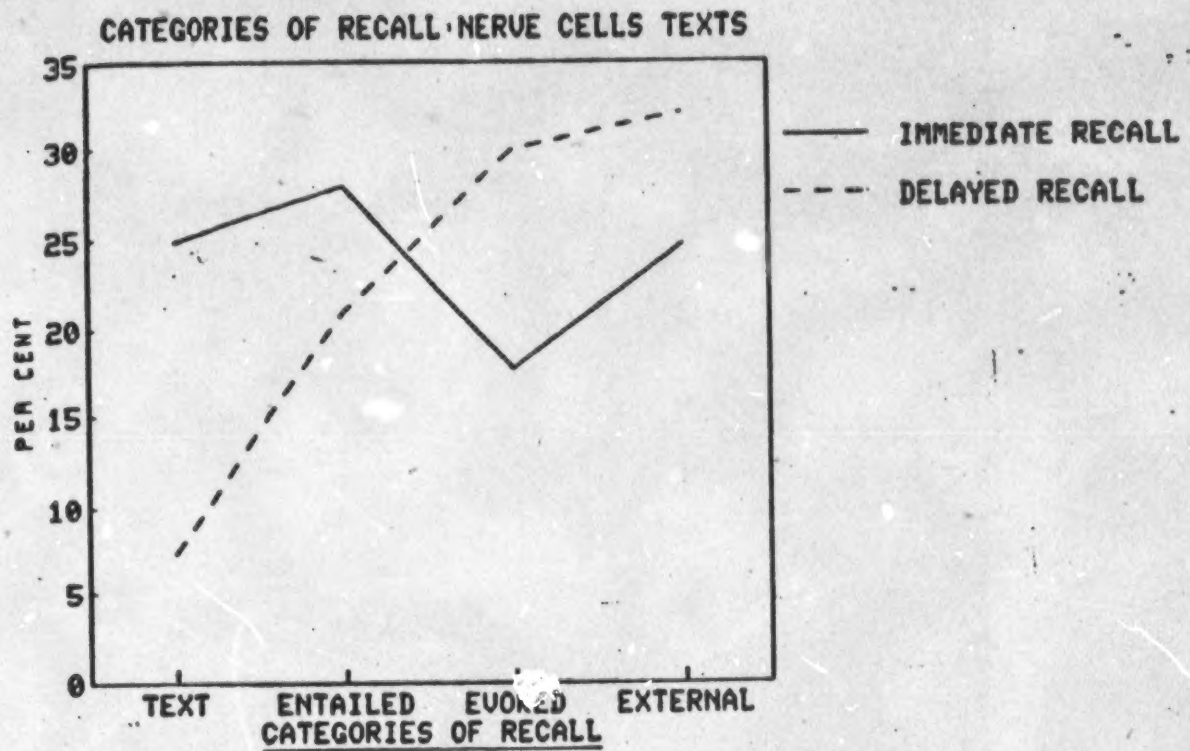
Figure 4

Structural Organization of TELEPHONE
DESCRIPTIVE INFORMATIONAL Text

Appendix 2

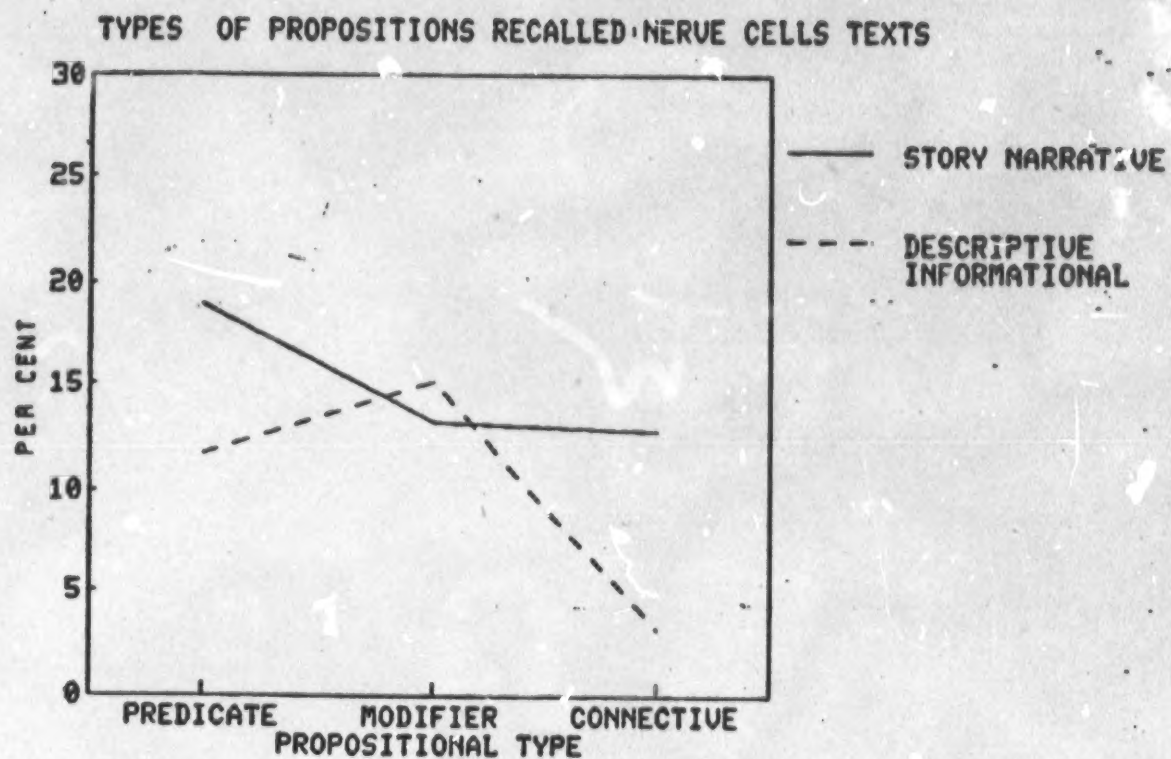
Results from the study (Furniss 1979)

- Figure 1 Categories of Recall: Nerve Cells
- Figure 2 Types of Proposition Recalled: Nerve Cells
- Figure 3 Hierarchical Levels of Information: Telephone
- Figure 4 Position of Recall Propositions: Nerve Cells
- Figure 5 Responses to the Interview Question
Which text did you remember better? Why?



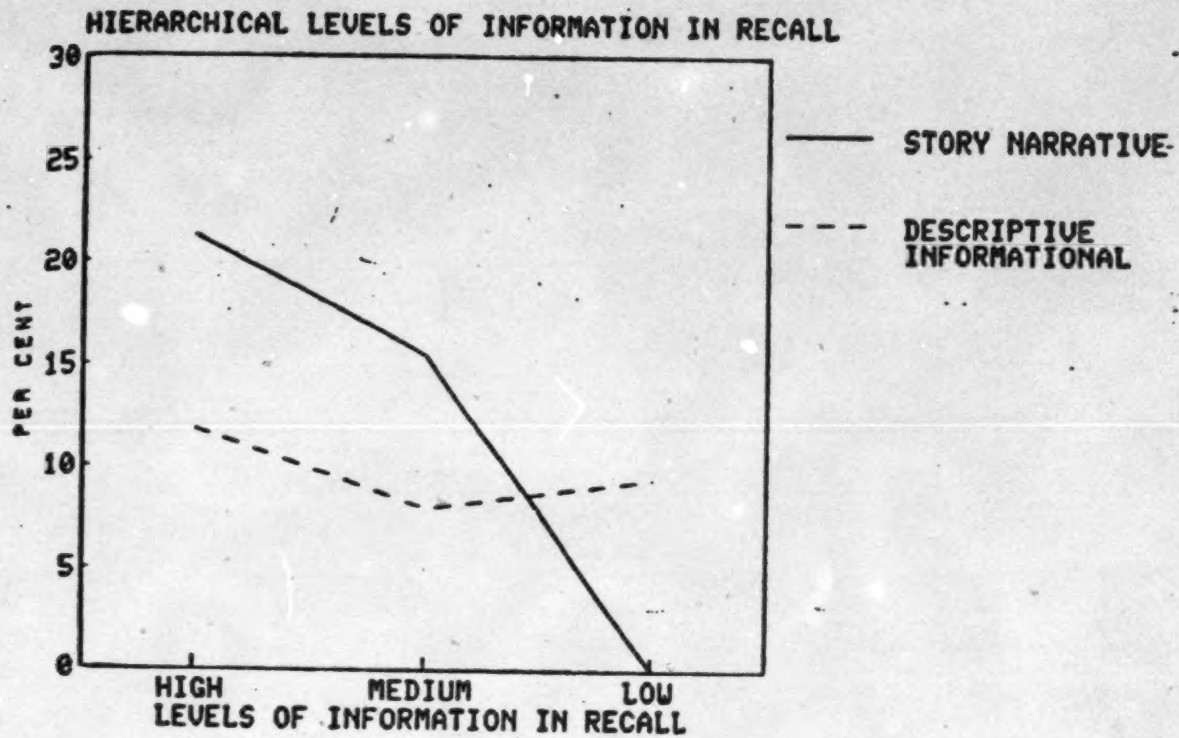
NERVE CELLS Texts
 Mean Recall Proportions for (B) Time of Recall and (C) Text
 Recall Categories for the Analysis of Variance
 ($p \leq .001$)

Figure 1



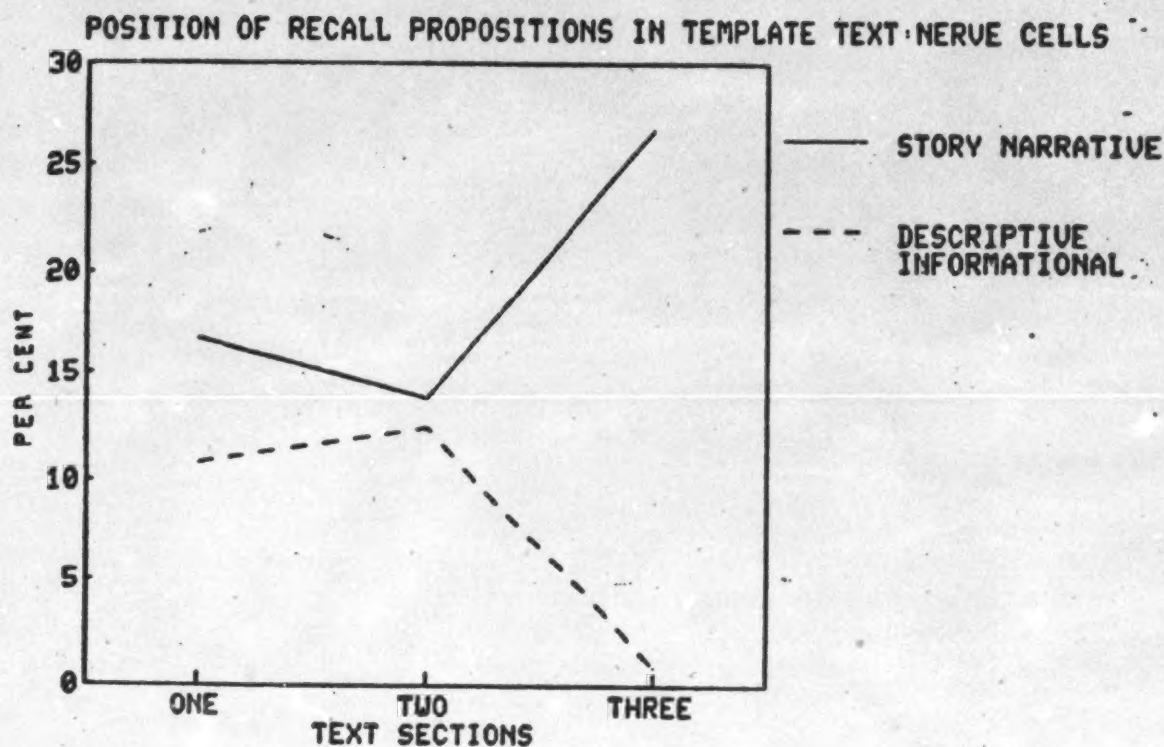
NERVE CELLS Texts
Mean Recall Proportions for (A) Text Structure and
(C) Types of Propositions Recalled for the
Analysis of Variance
($p < .001$)

Figure 2



TELEPHONE Texts
Mean Recall Proportions for (A) Text Structure and
(C) Hierarchical Levels of Information in Text
for the Analysis of Variance
($p < .001$)

Figure 3



NERVE CELLS Texts
Mean Recall Proportions for (A) Text Structure and
(C) Template Text Position of Recall Propositions
for the Analysis of Variance
($p \leq .001$)

Figure 4

Which Text did you Remember Better? Why?

Subj. Number	Sex	Experi- mental Assign- ment	Preferred Text		Text Structure of Preferred Text	Reason
			NERVE CELLS	TELEPHONE		
1	B	NSN TDI		✓	*	Null response
2	G	TSN NDI		✓	Δ	Prior knowledge
3	B	TDI NSN		✓	*	Prior knowledge
4	G	NDI TSN		✓	Δ	Prior knowledge
5	B	TSN NDI		✓	Δ	Interest effect
6	G	TDI NSN	✓		Δ	Practice effect
7	B	NDI TSN		✓	Δ	Null response
8	G	NSN TDI	✓		Δ	Prior knowledge
9	B	TDI NSN	✓		Δ	Specific text difficulty
10	G	NDI TSN		✓	Δ	Practice effect
11	B	NSN TDI	indiscriminate response			Practice effect
12	G	TSN NDI		✓	Δ	Interest factor
13	B	NDI TSN		✓	Δ	Interest factor
14	G	NSN TDI	✓		Δ	Prior knowledge
15	B	TSN NDI		✓	Δ	Interest factor
16	G	TDI NSN	✓		Δ	Interest factor
17	B	NSN TDI		✓	*	Interest factor
18	G	TSN NDI		✓	Δ	Prior knowledge
19	B	TDI NSN	✓		Δ	Interest factor
20	G	NDI TSN		✓	Δ	Prior knowledge
21	B	TSN NDI	✓		*	Miscellaneous
22	G	TDI NSN	✓		Δ	Miscellaneous
23	B	NDI TSN		✓	Δ	Interest factor
24	G	NSN TDI	✓		Δ	Prior knowledge
25	B	TDI NSN		✓	*	Prior knowledge
26	G	NDI TSN	✓		*	Interest factor
27	B	NSN TDI		✓	*	Prior knowledge
28	G	TSN NDI		✓	Δ	Prior knowledge
29	B	NDI TSN	✓		*	Interest factor
30	G	NSN TDI		✓	*	Specific text difficulty
31	B	TSN NDI		✓	Δ	Prior knowledge
32	G	TDI NSN	✓		Δ	Practice effect

Δ STORY NARRATIVE

* DESCRIPTIVE INFORMATIONAL

Figure 5